GLAST Monthly PSR

Spacecraft

April 30, 2003

Joy Bretthauer
Observatory Manager

Accomplishments

- **4/21 – 4/25: SC PDR Dry Run #2**
  - Extremely productive preparation for SC PDR
    - Good job by Spectrum
    - THANKS to all who participated and gave feedback
  - GBM SIIS Acceptance Review;
  - Discussions to clarify: MOC training simulator, Observatory Pointing, Orbit insertion
  - Looking forward to SC PDR

- **S/C Manufacturing Activity**
- **Factory of the Future:**
  - Acoustic Chamber: 1st & 2nd level concrete poured; 3rd level Forms under construction

Accomplishments

Special Study Status:

- Task Study #3 (Ku-band): received task study proposal GSFC 4/18
- Task Study #4 (CDH Cross-strapping, LAT Harness, & MECO (Craig-Bampton out to 175 Hz): submitted to Spectrum on 4/23
- Task Study #5 (Structural Thermal Gamma ray) STGP analysis:
  - Requires LAT, Spectrum, & project support: LAT structural & thermal models required
  - drafted; pointing TIM held on 4/29; draft will be updated based on info from TIM, inputs from Thermal (Lou F.) and Mechanical (Sharon S.);

Accomplishments

- SRR RFA close-out to satisfy S/C PDR milestone payment:
  - **FSW SRR RFA status: in-progress**
  - **SRR RFAs (13 open)**
  - **2 require Spectrum responses (30, 31)**
  - **1 initial response requires additional info (11)**
  - **2 require LAT &GBM input (41, 42)**
  - **7 are in project review (7, 35, 34, 37, 14, 24, 25)**
  - **1 response given an SC PDR (27)**
- CDRL approvals via CCB: Post MPDR
- Options to Exercise:
  - **#6: Battery Life Test: complete;**
  - **Received proposal for 11th battery cell for Battery Life Test Battery (not included in Option 6 for 2, 5 cell packs)**

Accomplishments

Spectrum Astro – Systems Engineering Staffing

- –Mission OPs: Mark Davis replaces Ken Lewis
- –LV: John Honig replaces Bob Hunley
- –Jim Howe is Sys Eng; 2nd SE is TBD
  - •Role Has Been Filled Temporarily by a Combination of Scott Fallek and Larry Edgett
  - •Long Term Will Be Filled by New Hire (Actively Interviewing Candidates)

Issues/Problems

- Analysis & Verification of Observatory Pointing Knowledge
  - **Analysis requires LAT participation to properly model the grid out of plane motion wrt the LIP:**
    - **IMPACTS – early results for insight in meeting Level 1 pointing knowledge requirement; cost/schedule for SC or LAT if post-LAT CDR design changes are necessary**
- Mission Ops Training Simulator: Identified additional LAT/GBM instrument simulators (s/w or h/w) necessary to support
- Orbit insertion altitude: @ 525 km initial altitude lifetime < 5yrs.
- Slew Rate Requirements not being met with 1, failed reaction wheel
- Project Contamination Control Plan: non-existent; draft in-progress; basis of other spacecraft requirements per S/C MAR
- Systems Engineering Staffing @ SAI: requires additional manpower to support design trades, ROMs, special studies, etc.

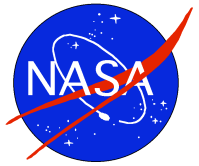
Upcoming Events

- ***GBM SIIS Delivery: May 19, 2003***
- ***NG/Litton SIRU Electronics Manufacturing – Early May***
- ***LAT SIIS Delivery: June 4, 2003***
- ***SC-Instrument ICDs signed soon; Formal deliverable with updates due in SC CDR version***

Other SC Activities:

GFE due: Final Version of LAT & GBM FEM – Jun 16, 03

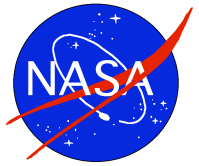
Upcoming Events



Milestone	Baseline	Non-ICCR Working
Date		
SCPDR	Feb 25, 03	May 5, 03
SCCDR	Nov 17, 03	Feb 9, 04
Bus I&T Start	Jul 1, 04	Aug 2, 04 –Structure Prep (*change from last month of Aug16, 2004*)
Bus I&T Complete	Dec 14, 04	Feb 15, 05

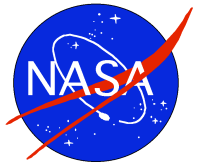
- IRR and Later Milestones Expected to Be Unaffected
- Detailed Schedule Buildup Still to Be Performed
- C&DH and EPS Development Are the Pacing Activities
- Dates for project milestones are incorporated in the SC PDR version of Spectrum's detailed schedule

Upcoming Events



Jan 28	*ICCR Reqs Peer Review*	*GPO in Gilbert*
Jan 29	*MPSR 3*	*GPO in Gilbert*
Feb 25	*MPSR 4*	*GPO in Gilbert*
Mar 20	*MPSR 5*	*Telecon*
Apr 21-24	PDR Dry Run 2	Gilbert/Telecon
Apr 22	MPSR 6	Gilbert
May 5-7	SCPDR	Gilbert
May 8	FSPDR	Gilbert
June 3,4	MPDR/NAR	GSFC
TBD	MIWG (Spectrum sugg. Date)	KSC
Feb 9-13, 2004	SCCDR/FSCDR	Gilbert
Mar 3-4, 2004	MCDR	GSFC

Rolling Wave Schedule



Activity ID	Activity Description	Original Dur	Current Start	Current Finish	Free Float	Total Float
Spacecraft						
Spacecraft Development						
Spacecraft Top-Level Development/Milestones						
0037	S/C Vendor Selection		30AUG02A	30AUG02A		
0043	S/C System Requirements Definition		03SEP02A	19NOV02A		
0496	S/C Kickoff Meeting		25SEP02A	26SEP02A		
0139	S/C SRR		20NOV02A	21NOV02A		
0097	S/C Development (Preliminary System Desig		22NOV02A	02MAY03		130
0115	S/C PDR		05MAY03	07MAY03		130
0094	S/C Development (Detailed System Design)		06JUN03	06FEB04		113
0118	S/C CDR		09FEB04	11FEB04		113
0046	S/C Component Fab & Test - SUMM		09FEB04	24JUN04		25
0553	S/C Bus Prep and Harness Integration-SUMM		04JUN04	07DEC04		25
0555	Flight Structure Ready For Bus I&T			24JUN04		25
1294	S/C Bus Eng Model Integration-SUMM		03SEP04	17SEP04		113
0565	S/C Bus EPS Integration-SUMM		20SEP04	23SEP04		113
0568	S/C Bus C&DH & SSR Integration SUMM		27SEP04	07OCT04		112
1300	S/C Bus TT&C Integration-SUMM		14OCT04	01NOV04		109
1303	S/C Bus Propulsion Subsystem Integration-S		29OCT04	04NOV04		134
1297	S/C Bus ACS Integration-SUMM		04NOV04	13DEC04		109
1306	S/C Full Bus Functional Testing-SUMM		16DEC04	04FEB05		109
0052	S/C Bus Ready for Observatory I&T			16FEB05		174

2002 2003 2004 2005

Start Date 03APR0
Finish Date 22DEC06
Data Date 01APR03
Run Date 30APR03 08:4

Early Bar
Progress Bar
Critical Activity

GL03 Sheet 1A of 1E

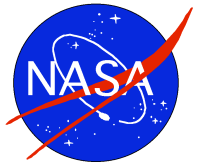
GLAST SC Project Schedule
For PSR on 4/30/03
Top-Level Milestones

Date	Revision	Checked	Approved

Rolling Wave Schedule

- ***See Spectrum Astro's Detailed Schedule***

- ***Optical Bench Prelim Design Complete: due July 03***
- ***Flight Solar Array Functional Tests: July 9 – July 22, 03***
  - *(root hinge & rr stack)*
- ***S/C SMS Mechanical GSE***
  - *Integration Stand/Dolly Ready (Frame Tooling): July 10, 2003*
  - *Solar Array 1 MGSE Ready: June 6, 2003*
- ***EM Models:***
  - *Electrical Power: PDU C&T, CCB, BBB, Backplane, VRB, etc.*
    - *June-July*
  - *CDH: NVM – Jun;*
  - *FSW: Design complete for Mission CSCI Build 1,2,3,*



Back - up

"Detail designs are not expected at this time, but system engineering, resource allocations and design analyses shall demonstrate compliance with requirements." - Per SOW

DAY 1, Monday 5/5/03

Start Time	Allocated Time	Topic	Presenter	Sow Required Items	Additional Items to Include
Overview					
8:00 AM	10	Welcome	Dave O./Kevin Grady/Chris		
8:10 AM	45	Introduction - Presentation Purpose - Reviewer Purpose - Objectives and Success Criteria - SRR RFAs (Corrective Action/Resolution Taken)	Chris Clark	All action items, collected at the previous review, shall be presented w/ the corrective action, or resolution, taken; Closure of Action Items From SRR	Program organizations and scope; SA-200HP heritage
8:55 AM	15	Schedule	Chris Clark	Schedules	
Break					
9:10 AM	10	Break			
Mission Architecture					
9:20 AM	45	Mission Architecture - Architecture Overview - Requirements Overview - Mission Resources and Budgets - Mission Level Operations Concept	Jordan Evans	System Resource Allocations, System Error Budgets (and Budget Determination); Science and Technical Objectives, Requirements, General Specification; Performance Requirements; System Performance Budgets	Mission Level Operations Concept
10:05 AM	40	Spectrum Astro Systems Engineering - SE Process (and Relationship to GPO) - System Documentation - Mission Interfaces - Changes Since SRR - Verification, Interface Development	Jordan Evans		
Spacecraft Architecture					
10:45 AM	60	Spacecraft Architecture Overview - Spacecraft Layout - Spacecraft Modes - Safe Modes - Changes Since SRR - Subsystem Development Process - Peer rvws etc.	Kendall Nii	Mass, Power, Volume Estimates; SC Error Budgets (and Budget Determination); Redundancy; Block Diagram; Performance Requirements	
Lunch					
11:45 AM	60	Lunch			
Spacecraft Architecture (Cont.)					
12:45 PM	60	Instrument Accommodations - Instrument Interfaces - ICD Development Status - Changes Since SRR	Tim Morse	Interface Requirements	
1:45 PM	20	Mission Analysis and Controlled Re-Entry Overview	Jim Howe	Orbital Debris Assessment; De-orbit Strategy; Flight Dynamics, Orbit Insertion, Maintenance, Disposal	
2:05 PM	60	Structures and Mechanisms Subsystem	Scott Dow	Mechanical/Structural Design, Analyses, Life Tests; Optical/Radiometric Design and Analyses (FOVs); Qualification and Environmental Test Plans and Test Flow at the Box and Subsystem Levels; Component List and Flight Heritage; Specific Analysis and Margins	Optical Bench Design Trades and Evolution
Break					
3:05 PM	10	Break			
Spacecraft Architecture, Cont…					
3:15 PM	75	Thermal Control Subsystem	Aaron Gilchrist	Thermal Design and Analyses; Qualification and Environmental Test Plans and Test Flow at the Box and Subsystem Levels; Component List and Flight Heritage; Specific Analysis and Margins: Thermal Flight Predictions; Estimates of Weight, Power, Volume and th	
4:30 PM	60	Electrical Power Subsystem	Robb Pinkerton	Electrical/Power Design and Analyses; Qualification and Environmental Test Plans and Test Flow at the Box and Subsystem Levels; Component List and Flight	

DAY 2, Tuesday 5/6/03					
Start Time	**Allocated Time**	**Topic**	**Presenter**	**Sow Required Items**	**Additional Items to Include**
Spacecraft Architecture, Cont…					
				Design; Qualification and Environmental	
8:00 AM	120	Command and Data Handling Subsystem	Nick Gaudio	Test Plans and Test Flow at the Box and Subsystem Levels; Component List and Flight Heritage; Specific Analysis and Margins: Data Flow, Storage, and Loading; Estimates of Weight, Power, Volume and the Basis for The	
12:00 AM					
10:00 AM	10	Break			
Spacecraft Architecture, Cont…					
10:10 AM	90	Guidance, Navigation, and Control Subsystem	Igor Lazbin	Design and Analysis; Safehold Design and Analysis; Qualification and Environmental Test Plans and Test Flow at the Box and Subsystem Levels; Component List and Flight Heritage; Specific Analysis and Margins: GN&C Pointing Budgets Including Attitude Contro	
Lunch					
11:40 AM	60	Lunch			
Spacecraft Architecture, Cont…					
12:40 PM	60	Flight Software Subsystem	Cyp Colbert	Requirements, Design, Structure, Logic Flow Diagrams, CPU Loading, Design Language and Development Systems; Design/Analysis/Development Process; Qualification Test Plans and Test Flow at the "Box" and Subsystem Levels; "Component" List and Flight Heritage	
1:40 PM	60	Communications Subsystem	Mark Carlson	Design; Qualification and Environmental Test Plans and Test Flow at the Box and Subsystem Levels; Component List and Flight Heritage; Specific Analysis and Margins: Communication Links; Estimates of Weight, Power, Volume and the Basis for The Estimates; P	
Break					
2:40 PM	10	Break			
Spacecraft Architecture, Cont…					
2:50 PM	45	Propulsion Subsystem	Craig Langenfeld	Design; Qualification and Environmental Test Plans and Test Flow at the Box and Subsystem Levels; Component List and Flight Heritage; Specific Analysis and Margins: Disposal; Estimates of Weight, Power, Volume and the Basis for The Estimates; Performance	
3:35 PM	60	Fault Management Approach	Scott Fallek	Overview of Observatory Fault Management Architecture; Safehold Design; Preliminary List of Unique or Additional Telemetry Points For Monitoring De-Orbit and	

DAY 3, Wednesday 5/7/03					
Start Time	**Allocated Time**	**Topic**	**Presenter**	**Sow Required Items**	**Additional Items to Include**
Integration and Test					
8:00 AM	20	MGSE	Scott Dow	Ground Support Equipment Design	
8:20 AM	30	EGSE	Tim Irwin	Ground Support Equipment Design	
~~8:50 AM~~	~~45~~	~~Simulators~~	~~Roger Jellum~~	~~SIISs, Moc Sims, etc.~~	
9:35 AM	60	Spacecraft and Observatory I&T	Ron Zitek	SC and Obs Design Verification, Test Flow, Calibration, and Test Plans, Qualification and Environmental Test Plans and Test Flow at the SC and Obs Level	
10:35 AM	20	Shipping and Handling	Ron Zitek	Plans for Shipping Containers, Environmental Control and Mode of Transportation	
Break					
10:55 AM	10	Break			
Launch Site and On-Orbit					
11:05 AM	30	Launch Vehicle Integration - Documentation - Interfaces - Launch Site Processing	Jordan Evans	LV Interfaces and Drivers	
11:35 AM	60	Observatory Operationcs Concept and On-Orbit Verification - Mission Modes - Contacts - ICD Development Status	Ken Lewis	Interface Requirements (GN, SN, MOC); Observatory Operations Concept; Design Verification, Test Flow, Calibration, and Test Plans	
Lunch					
12:35 PM	60	Lunch			
1:35 PM	30	EMI/EMC - Environments - Tests - Design Requirements	Joe Chott	Specific Analysis and Margins: EMC, Magnetics	
Mission Assurance					
2:05 PM	15	Observatory System Safety	Bill Jay	Safety Hazards Identified for Flight, Range, Ground Hardware and Operations	
2:20 PM	20	Observatory Mission Assurance - QA	Mike Estipona	Quality Control	
Break					
2:40 PM	10	Break			
2:50 PM	50	Observatory Mission Assurance - Specialty Engineering - FMEA, PRA, FTA, Reliability, Contamination	Mark Porter	Parts Selection, Qualification, and FMEA Plans; De-Rating Criteria; Radiation Hardness; Identification of Single Point Failure Modes and Critical Design Areas Which May Be Life Limiting; EEE Parts Checklist; Contamination Requirements and Control Plan; Re	
Closing Assessments					
3:40 PM	30	Spectrum Astro Risk Assessment	Jordan Evans	Risk Status, Analysis, and Mitigation	
4:10 PM	15	Spectrum PM Assessment	Chris Clark	Problem Areas and Open Items	
Caucus, and Adjourn					
4:25 PM	60	Review Team Caucus			
5:25 PM	60	Wrap-Up, RFA Review	Review Chair		
6:25 PM	0	Adjourn	-		
Backup Material					
		Acronyms and Abbreviations		Acronyms and Abbreviations	
	180	3 lunches			
	90	2x15 min breaks per day			
		total minutes			
	0	total hours			
	0	total days			

FSW PDR, Thursday 5/8/03					
Start Time	**Allocated Time**	**Topic**	**Presenter**	**Sow Required Items**	**Additional Items to Include**
Overview					
8:00 AM	15	Welcome	Dave O./GPO/Chris		
Software Management Plan					
8:15 AM	120	Software Management Plan - Organization/WBS/Project Relationship - Deliverables and Schedules, Time Budgets - CM and Product Assurance Approach, Tools - Requirements and Interface Approach - Development Tools and Approach - SW CDRL Status -	Cyp Colbert		
Technical					
10:15 AM	30	FSW Requirements Analysis Update	Cyp Colbert		
10:45 AM	60	Software Architecture - Task and/or Functional Allocations - Internal Interface Identification (ICD?) - External Interfaces Identification (ICD?)	Cyp Colbert		
11:45 AM	60	GN&C Software Architecture	Igor Lazbin		
12:45 PM	15	Identified Technical Risks; Mitigation	Cyp Colbert		
1:00 PM	45	Wrap-Up, Review Team Caucus, RFA Review	Review Chair		
Adjourn					